A versatile approach to high-throughput microarrays using thiol-ene chemistry.

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Public Summary:
Microarray technology has become extremely useful in expediting the investigation of large libraries of materials in a variety of biomedical applications, such as in DNA chips, protein and cellular microarrays. This paper seeks to extend this technology to the realm of stem cells. In the development of cellular microarrays, traditional high-throughput printing strategies on stiff, glass substrates and non-covalent attachment methods are limiting. We have developed a facile strategy to fabricate multifunctional high-throughput microarrays embedded at the surface of a soft hydrogel substrate using a specific type of chemistry known as thiol-ene chemistry. This user-friendly method provides a platform for the immobilization of a combination of bioactive and diagnostic molecules, such as peptides and dyes, at the surface of poly(ethylene glycol)-based hydrogels. Such an array can be used to screen for materials that induce differentiation of stem cells. The robust nature of chemistry allows for a range of attachment strategies in a fast and reliable manner, and two complementary strategies for the attachment of active molecules are demonstrated. This technology has wide applicability in the stem cell field.

Scientific Abstract:
Microarray technology has become extremely useful in expediting the investigation of large libraries of materials in a variety of biomedical applications, such as in DNA chips, protein and cellular microarrays. In the development of cellular microarrays, traditional high-throughput printing strategies on stiff, glass substrates and non-covalent attachment methods are limiting. We have developed a facile strategy to fabricate multifunctional high-throughput microarrays embedded at the surface of a hydrogel substrate using thiol-ene chemistry. This user-friendly method provides a platform for the immobilization of a combination of bioactive and diagnostic molecules, such as peptides and dyes, at the surface of poly(ethylene glycol)-based hydrogels. The robust and orthogonal nature of thiol-ene chemistry allows for a range of covalent attachment strategies in a fast and reliable manner, and two complementary strategies for the attachment of active molecules are demonstrated.